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# Pesticide Fact Sheet Number 124: Nabam

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16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

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b. Identifiers/Open-Ended Terms

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# EPA Pesticide Fact Sheet

Name of Chemical: NABAM
Reason for Issuance: REGISTRATION STANDARD
Date Issued: APRIL, 1987
Fact Sheet Number: 124

## DESCRIPTION OF CHEMICAL

Generic Name: Disodium ethylene bisdithiocarbamate

Common Name: Nabam

Trade Names: Chem Bam®; Dithane® D-14; Dithane® A-40; DSE®; Nabasan®; Parzate®; Spring Bak®.

EPA Shaughnessy Code: 014503

Chemical Abstracts Service (CAS) Number: 142-59-6

Pesticide Type: Fungicide

Chemical Family: Ethylene bisdithiocarbamate (EBDC)

U. S. and Foreign Producers: Alco Chemical Corporation; Vinnings Chemical Company; Rohm and Haas

## USE PATTERNS AND FORMULATIONS

Registered Uses: Industrial sites (cooling towers, evaporative condensers, air washer systems, secondary oil recovery water and drilling fluids, pulp and paper mills, cane sugar mills, beet sugar mills). All registered food (except for use in sugar mill flume water) and ornamental uses of nabam, a total of 35, are currently suspended.

Major Uses: Domestic usage of nabam as a pesticide (Typical current year basis (1983-1985)):

| Sector | lbs. x 1,000 | Percent |
|---|---|---|
| Cooling Water | 475 | 40 |
| Sugar | 425 | 37 |
| Paper | 275 | 23 |
| Totals | 1175 | 100 |

Formulation Types Registered: Ready-to-use 3.75 to 22% nabam, Formulation Intermediates - 22.5 to 30% nabam, and Soluble Concentrates - 22% or 93% nabam.

Methods of Application: In most industrial uses, nabam is added directly to water either by a single dose or continuous feed.

Application Rates: Rates range from .09 to 3.0 parts per million (ppm) in sugar processing; 30 to 120 ppm in pulp and paper processing; 2.6 to 60 ppm in water cooling towers. General industrial preservative uses are in the range of 30 to 120 ppm.

Usual Carrier: Water

## SCIENCE FINDINGS

Summary Science Statement: A major toxicological concern from exposure to nabam is the hazard to the human thyroid from presence of ethylenethiourea (ETU), a contaminant, degradation product, and metabolite present in nabam and other EBDC fungicides. Additional chronic studies on nabam are required for further evaluation. Moreover, ETU has caused developmentally toxic/teratogenic effects in rats and hamsters. There are no adequate teratology studies on nabam. Teratology studies with nabam are required before its teratogenicity can be fully assessed.

ETU has been classified as a Group B2 carcinogen in accordance with the Agency's Guidelines for Carcinogen Risk Assessment (September 26, 1986, 51 CFR 33992), based on studies which show that it induced an increased incidence of thyroid adenomas and adenocarcinomas in rats and hepatomas in mice. Because of the presence of ETU in nabam, the Agency is considering whether further regulatory considerations are warranted.

Available data are not adequate to assess the environmental fate of nabam. However, studies do indicate that ETU, the major degradate of nabam, has leaching potential in certain soil types. A complete assessment of the environmental fate, including the potential for groundwater contamination, from the use of nabam products will be undertaken when data are available.

Available data are insufficient to completely evaluate the ecological effects of nabam. Based on available data, nabam is moderately toxic to freshwater fish; moderately to highly toxic to certain estuarine organisms.

Physical/Chemical Characteristics:

Physical state: Liquid at 25° C

Empirical Formula: $C_4H_6N_2Na_2S_4$

Molecular Weight: 256.3

Toxicology Charateristics:

Major Route of Exposure: Dermal

Acute Toxicity:

Oral Toxicity: Toxicity category II

Dermal Sensitization: Skin sensitizer

Mutagenicity: Additional studies required

Negative - Host-mediated assay in mice in Salmonella typhimurium.

Positive - Sister-chromatid exchanges in CHO cells

Negative - In Vivo bone marrow cytogenetic assay

Physiological and Behavioral Characteristics

Mechanism of Pesticidal Action: Nabam inhibits enzyme activity by complexing with metal-containing enzymes including those involved with the production of adenosine triphosphate (ATP).

Metabolism: Nabam appears to be rapidly absorbed from the gastrointestinal tract, distributed to target organs and excreted almost totally within 96 hours.

Environmental Characteristics:

Photodecomposition and/or Volatility: Studies required

Hydrolysis: Studies required

Anaerobic Aquatic Metabolism: Studies required

Leaching and adsorption/desorption studies: Nabam is slightly mobile in certain soil types. Additional studies required.

Ecological Characteristics:

Freshwater Fish Toxicity: Moderately toxic. Studies required.

Effects on Non-target Insects: Relatively nontoxic to honey bees.

Tolerance Assessment

There are no established tolerances for residues of nabam per se on any food or feed items. All food crop uses of nabam are currently suspended. When used on food crops nabam is tank mixed with zinc sulfate leading to the formation of zineb. Nabam is not mixed with zinc sulfate when used on onions to control smut. Therefore, for this use registrants are required to submit residue data on nabam. For the other food crop uses, application actually consists of a solution of zineb instead of nabam. Therefore, residues in agricultural commodities treated with nabam are expected to be zineb.

The use of nabam as an industrial biocide to treat flume water in sugar beet mills is considered to be a treatment of a raw agricultural commodity. Regulations have been established by the Food and Drug Administration under 21 CFR 173.320(b)(3) for nabam residues following application to sugar mill grinding, crusher and/or diffuser systems. The treatment of flume water, transporting and washing systems are under EPA's jurisdiction. Residue data are required in this Standard to determine if the residues concentrate in any of the processed sugar commodities.

SUMMARY OF REGULATORY POSITION AND RATIONALE

EPA is currently evaluating the potential human health risks resulting from the food, field and food crop, and terrestrial non-food uses of nabam to determine whether additional regulatory action is warranted on nabam and the other EBDC pesticides containing the common contaminant, degradation product, and metabolite, ETU. ETU is mutagenic, oncogenic and teratogenic, and the Agency has classified it as a Group B2 oncogen (Probable Human Carcinogen).

After considering exposure to ETU from the industrial, non-food uses of nabam, the Agency has concluded that the risks from exposure to ETU from use of nabam are not a concern for most industrial uses at this time because applicator exposure, based on available information, appears negligible. The Agency lacks data to assess exposure to nabam from the metalworking fluid and tanning uses. Additional information is being required for all industrial uses. The Agency does not believe that further regulatory action on nabam products registered for industrial non-food uses is warranted at this time.

The Agency will not consider any new food use tolerances for nabam at this time. The Agency will consider the need for establishment of tolerances for ETU and any intermediate metabolites when data are sufficient to permit such decisions.

While data gaps are being filled, currently registered manufacturing-use products (MP's) and end-use products (EP's) containing nabam as the sole active ingredient may be sold

distributed, formulated, and used, subject to the terms and conditions of the nabam registration standard. However, significant new uses will not be registered. Registrants must provide or agree to develop and provide additional data in order to maintain existing registrations.

The Agency has determined that all data will be immediately reviewed as they are submitted.

Precautionary Statements Required on Labels:

Manufacturing-Use Products

"This pesticide is toxic to fish. Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or public water unless this product is specifically identified and addressed in an NPDES permit. Do not discharge effluent containing this product to sewer systems without previously notifying the sewage treatment plant authority. For guidance, contact your State Water Board or Regional Office of the EPA."

End-Use Products

Agricultural Use Products

"This pesticide is toxic to fish. Drift and runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Do not apply directly to water or wetlands (swamps, bogs, marshes, and potholes). Do not contaminate water by cleaning of equipment or disposal of wastes."

All Home Use Products

"PROTECTIVE MEASURES: Always spray with your back to the wind. Wear long-sleeve shirt, long pants, and rubber gloves. Wash gloves thoroughly with soap and water before removing. Change your clothes immediately after using this product and launder separately from other laundry items before reuse. Shower immediately after use."

Home Use Products with Food Uses

"Preharvest intervals on this label are specified so that pesticide residues will be at an acceptable level when the crop is harvested."

All Agricultural Products

"After (sprays have dried/dusts have settled/vapors have dispersed, as applicable) do not enter or allow

entry into treated areas until the 24-hour reentry interval has expired unless wearing the personal protective equipment listed on the label."

"WORKER SAFETY RULES

Keep all unprotected persons, children, livestock, and pets away from treated area or where there is danger of drift.

"Do not rub eyes or mouth with hands. See First Aid (Practical Treatment Section)."

"PERSONAL PROTECTIVE EQUIPMENT

HANDLERS (MIXERS, LOADERS, AND APPLICATORS) AND EARLY REENTRY WORKERS MUST WEAR THE FOLLOWING PROTECTIVE CLOTHING AND EQUIPMENT: a long-sleeve shirt and long pants or a coverall that covers all parts of the body except the head, hands, and feet; chemical resistant gloves; shoes, socks, and goggles or a face shield. During mixing and loading, a chemical resistant apron must also be worn.

During application from a tractor with a completely enclosed cab with positive pressure filtration, or aerially with an enclosed cockpit, a long-sleeve shirt and long pants may be worn in place of the above protective clothing. Chemical resistant gloves must be available in the cab or cockpit and worn while exiting.

IMPORTANT! Before removing gloves, wash them with soap and water. Always wash hands, face, and arms with soap and water before eating, smoking or drinking. Always wash hands and arms with soap and water before using the toilet.

After work take off all clothes and shoes. Shower using soap and water. Wear only clean clothes. Do not use contaminated clothing. Wash protective clothing and protective equipment with soap and water after each use. Personal clothing worn during use must be laundered separately from household articles. Clothing and protective equipment heavily contaminated or drenched with napam must be destroyed according to state and local regulations.

HEAVILY CONTAMINATED OR DRENCHED CLOTHING CANNOT BE ADEQUATELY DECONTAMINATED.

During aerial application, human flaggers are prohibited unless in totally enclosed vehicles."

Industrial Use Products

"This pesticide is toxic to fish. Spills, sprays, and runoff from use site may be hazardous to aquatic organisms in neighboring areas. Do not apply directly to water or wetlands (swamps, bogs, marshes, and potholes). Do not contaminate water by cleaning of equipment or disposal of wastes."

"HANDLE (INCLUDING MIXING, LOADING, OR APPLYING) THIS PRODUCT ONLY WHEN WEARING THE FOLLOWING PROTECTIVE CLOTHING AND EQUIPMENT: A long-sleeve shirt and long pants or a coverall that covers all parts of the body except the head, hands, and feet; chemical resistant gloves; and goggles or a face shield. During mixing and loading, a chemical resistant apron must also be worn."

SUMMARY OF MAJOR DATA GAPS

Product Chemistry - All

Residue Chemistry - Plant and animal metabolism
Residue studies

Toxicology - Acute dermal and inhalation toxicity
Primary eye and dermal irritation
21-day subchronic dermal
Chronic toxicity (rodent and nonrodent) (food uses)
Oncogenicity (rat and mouse)(food uses)
Teratology (rabbit and rat)
Reproduction (rat)
Mutagenicity (gene mutation, cell transformation, unscheduled DNA synthesis)
Percutaneous dermal absorption

Ecological Effects - Avian oral toxicity
Avian dietary toxicity
Freshwater fish toxicity
Freshwater invertebrate toxicity
Estuarine and marine organism toxicity
Aquatic organism accumulation
Simulated or actual field testing-aquatic organisms
Nontarget area phytotoxicity-aquatic plant growth

Environmental Fate - Hydrolysis
Photodegradation (water, soil)
Aerobic and anaerobic soil metabolism
Aerobic and anaerobic aquatic metabolism
Leaching and adsorption/desorption

Volatility (laboratory)
Field dissipation (terrestrial,aquatic)
Rotational crops (confined)
Fish accumulation

Reentry - Reentry protection studies

- Ethylenethiourea (ETU) -

Toxicology - Chronic (rodent and nonrodent)
Reproduction
Dermal (percutaneous) absorption
Mutagenicity (promotion)

Environmental Fate - Hydrolysis
Photodegradation (soil and water)
Aerobic and anaerobic soil metabolism
Leaching and adsorption/desorption
Degradation (soil)

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DISCLAIMER: The information presented in this Pesticide Fact Sheet is for information purposes only and may not be used to fulfil data requirements for pesticide registration and reregistration.